

Appl. No.: 09/508,805  
Amdt. dated: August 9, 2005  
Reply to Office Action of: March 9, 2005

### **REMARKS**

The applicants note that the filing date recorded on the mailing cover sheet of the Office Action is given as May 31, 2000. The applicants believe that this is an error, and that the correct filing date should be March 16, 2000. Appropriate correction is requested.

The applicants have carefully studied the outstanding Final Office Action. The applicants gratefully acknowledge the Examiner's indication that claims 127, 150, 152-157, 177 and 178 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Since the applicants believe the base claim of these claims to be allowable, as further expounded in this amendment, the applicants prefer not to rewrite these claims in independent form until after examination as to the merits of the base claim.

The applicants respectfully submit that the Examiner's final rejection is based on an incorrect interpretation of the prior art cited. The present response is intended to be fully responsive to all points of final rejection raised by the Examiner, and is believed to place the application in condition for allowance. Furthermore, the applicants submit that the only amendment made to the claims is the correction of a single typographical error and the cancellation of some of the rejected claims, such that a further search should not be required. For these reasons, the applicants request that this amendment be entered by the Examiner, and earnestly request favorable reconsideration and allowance of the application.

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### **Claim amendments**

Claim 179 has been amended by replacement of the word "tuning" with the word "timing".

Claims 180-190 have been cancelled without prejudice, the applicants reserving the right to file these claims in a Divisional Application.

Claim rejections - 35 USC § 102

Claims 180, 182 and 184 stand rejected under 35 U.S.C. 102(b) as being anticipated by Fabinski et al. (US 5,486,699). Claims 180-190 have been cancelled without prejudice, thus rendering this rejection moot.

### **Claim rejections - 35 USC § 103(a)**

Claims 112, 114, 116, 118, 125, 128, 129, 130-136, 158, 160, 161, 163-165, 166-168 and 173 stand finally rejected under 35 U.S.C 103(a) as being unpatentable over Sauke et al., in view of Fabinski et al. The Examiner states that "Sauke et al has a device for measuring a  $^{13}\text{CO}_2/^{12}\text{CO}_2$  ratio including sample chamber and a reference chamber 68 and 70, where the reference chamber has a reference gas containing both the first and second isotopic species (see column 7, lines 45-55). Rather than having two measuring chambers and two reference chambers, the device has one measuring and one reference chamber, where the light from the light source is cycled from a first wavelength characteristic of a first isotopic species to a second wavelength characteristic of a second isotopic species and passed through each chamber. Fabinski shows a system for making the same measurement, where it has 2 sample and 2 reference chambers, each receiving only one of the two measuring wavelengths. From this teaching, it would have been obvious to modify Sauke to use the measuring arrangement of Fabinski, so as to reduce the complexity of design of the system and to reduce measurement time. The system of the combination further has detectors that simultaneously receive the light beams that pass through the chambers."

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The applicants respectfully submit that there could be no possible motivation to combine Fabinski et al., with Sauke et al., such a combination being contraindicated, for a number of reasons, as follows:

(a) Sauke et al describes use of a single source, cycled between wavelengths. The system therefore uses a time switched measurement, measuring first at one wavelength, retuning the source and then measuring at the second wavelength, and uses only a single sample chamber and a single reference chamber. In such a system which uses sequential measurements, there would be no reason whatsoever to add another sample and reference chamber, and such addition would serve no useful purpose in improving the measurement technique, since the measurements in the added chambers would in any event have to await switching of the source wavelength. The applicants thus submit that it would not be obvious to modify Sauke to use the measuring arrangement of Fabinski, as asserted by the Examiner.

(b) Conversely, the system described in Fabinski et al. has single isotopes in each of the reference chambers. The novelty of the Fabinski system is directed at the elimination of the effects of transverse sensitivity of the  $^{13}\text{CO}_2$  absorption in a breath sample, by the presence of the dominant  $^{12}\text{CO}_2$ . This is done by means of a  $^{12}\text{CO}_2$  optical filter in the  $^{13}\text{CO}_2$  detection channel, in conjunction with electronic compensation of the  $^{13}\text{CO}_2$  detection channel signal by means of an absorption signal obtained from the  $^{12}\text{CO}_2$  channel. According to Fabinski, the use of the calibration vessels (reference chambers) is to ensure that the system gives accurate readings in spite of "aging phenomena ..... and transportation" (col.3, lines 8-10). Since the novelty of the Fabinsky system is directed at a method of overcoming the problem of transverse sensitivity, there would be no reason whatsoever for Fabinski to **introduce** exactly such a transverse sensitivity problem into his calibration procedure, by the use of two isotopes in his calibration vessels, when his

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use of single isotope fills avoids the problem! The applicants thus submit that it would also not be obvious to modify Fabinski to use the measuring arrangement of Sauke.

(c) Finally, with regard to the Examiner's assertion that "it would have been obvious to modify Sauke to use the measuring arrangement of Fabinski, so as **to reduce the complexity of design** of the system and **to reduce measurement time**" (emphasis added), the applicants respectfully submit that even if such adaptation of the system of Sauke et al were indicated, which the applicants strongly traverse as explained above, neither of the Examiner's above mentioned "advantages" would be relevant in the system described in Sauke et al. Sauke et al., specifically teaches that the complexity of the design of his system would be reduced, by **reducing** the number of chambers, and **not** by increasing them, as taught by Fabinski. This is clearly stated in Sauke et al., in col. 8, lines 6-10: "Indeed, the present invention envisions that the reference cell 70 and null beam portion 51 can be omitted and the sample cell 68 alternately charged with sample gas, evacuated, and recharged with reference gas to assume the function of the reference cell 70 and the null beam portion 51." The applicants understand from this, that the advantageous direction of construction taught by Sauke et al., i.e. the reduction of the number of chambers used, is in complete apposition to the teachings of Fabinski et al., which shows the essentiality of multiple chambers. To the best of the applicants' understanding, "the reduction of the complexity of design of the system" envisaged by Sauke et al., would be in the use of a **single** chamber for all functions, which is a construction completely opposed to that of Fabinski et al., and even more so to that described in the present claimed invention. Furthermore, since the measurements of Sauke et al are performed sequentially, the use of multiple chambers as taught by Fabinski, would not, contrary to the Examiner's assertion, result in any reduction in measurement time.

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The Examiner further asserts that "the techniques of Fabinski and Sauke are well known to be interchangeable, as evidenced by US Patent 5,127,406 to Yamaguchi et al., (see Figs. 1 and 2). In response, the applicants respectfully submit that there is no basis for comparing the respective techniques of Fabinski and Sauke, with the two techniques shown in Figs. 1 and 2 of Yamaguchi. In Yamaguchi et al., the only difference between the arrangement of Fig. 1 and that of Fig. 2 is the replacement of one light source and two detectors with two light sources and one detector. Other than that, the component of the system between the source(s) and the detector(s) is identical in the two techniques shown. The sample between the source(s) and detector(s) in both Figs. 1 and 2 is the same sample of living tissue in the two techniques. For this reason, the two measurement techniques provide equivalent results.

In the cases of Fabinski and Sauke, on the other hand, in the first place, the "sample" between the source(s) and detector(s) are completely different for the two techniques - in the case of Sauke, there are single chambers with one type of filling containing multiple isotopic samples, and in the case of Fabinski, there are multiple chambers with a different type of filling,. Therefore, there is no reason that the outcome of these two types of measurements should be comparable.

Secondly, Yamaguchi et al shows the apparent equivalence of **one** source and **two** detectors with **two** sources and **one** detector. In the case of Fabinski and Sauke, on the other hand, the comparison is between systems having – in the case of Sauke, **one** source and **two** detectors, and in the case of Fabinski, **two** sources and **two** detectors.

For both of the above reasons, the applicants therefore respectfully submit that the Examiner's comparison of Figs. 1 and 2 of Yamaguchi with the arrangements present respectively in Fabinski and Sauke, is unjustified, and cannot therefore be used to show

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the interchangeability of Fabinski and Sauke.

In addition to the above arguments, the applicants respectfully add that there is no reason for combining the teachings of Sauke et al., with those of Fabinski et al., since neither of these patents show or suggest how their respective teachings should or could be combined.

For all of the above reasons, the applicants respectfully submit that it would not be obvious to combine these teachings of Sauke et al., with those of Fabinski et al., and that claim 112 should not be considered unpatentable over Sauke et al., in view of Fabinski et al.

The applicants also respectfully submit that claims 113-178 and 191-192 are all dependent on claim 112, which is deemed allowable, and add further patentable subject matter. Claims 113-178 and 191-192 are therefore also deemed allowable.

Claim 179 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sauke et al., in view of Eckstrom et al., and Rosenfeld et al. The Examiner asserts that "Sauke et al. shows a device with a single source that emits two wavelengths of light that travel through a sample reference, and null chamber, and 3 detectors one for each chamber. Eckstrom further teaches that a single source and multiple sources for producing one wavelength each are equivalent. Hence, it would have been obvious to modify Sauke to use multiple sources, as it is merely the substitution on one known equivalent for another. In addition, Eckstrom teaches using a chopper, which is a detection differentiator, as claimed. The above combination does not use a gas discharge lamp. Rosenfeld et al., is a gas analyzer that does. From this teaching, it would have been obvious to modify the above combination to use a gas discharge lamp, as it is merely the

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substitution of one known light source for another. In addition, since the detector detects all 4 wavelengths, it inherently has a differentiator to distinguish the different wavelengths." The applicants respectfully disagree with the Examiner's grounds for rejection for a number of reasons:

(a) In the first place, the applicants question the Examiner's suggestion that although Sauke et al shows a single source that emits two wavelengths of light, "it would have been obvious to modify Sauke to use multiple sources, as it is merely the substitution on one known equivalent for another". The applicants respectfully submit that the substitution of the tuned laser diode source of Sauke et al by two such laser diode sources is neither indicated in Sauke, nor is there any motivation to do so in the Sauke apparatus, and hence such substitution cannot be considered obvious.

Sauke et al uses a single tunable laser diode source since a single laser source is more economical than providing two separate laser sources. In Col. 2, lines 4-12 of Sauke et al., it is stated that breath tests are not yet in general use because of the high cost of instrumentation, and in col. 3, lines 7-8, Sauke specifically states that one object of his invention is to provide a spectrometer which is cost effective. Since use of a single tunable laser diode source provides the Sauke et al invention with completely adequate means of covering both of the isotopic wavelengths of interest, there is no reason or motivation whatsoever to use two such laser diodes to fulfill this requirement. The applicants further note that the feature of the use of a single laser diode source providing different wavelengths is so central to the invention of Sauke et al that it is an element of both of the independent claims therein which describe the instrument structure, namely claims 1 and 9. No other sources are claimed, nor are they envisaged anywhere in the application.

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The applicants therefore respectfully submit that it cannot be considered as obvious to modify Sauke to use multiple sources, this being equivalent to single sources as assertedly taught by Eckstrom, and that this aspect of Eckstrom cannot be used in combination with what is disclosed in Sauke et al. and in Rosenfeld, to render amended claim 179 of the present application obvious.

Furthermore, the applicants respectfully submit that there are a number of differences between the Examiner's above-quoted description of what is described in the cited references, and the recited elements of claim 179, which these references are asserted to render obvious.

(b) To the best of the applicants' understanding, nowhere in either Sauke et al., or in Eckstrom, or in Rosenfeld are there shown or suggested sources operating with respective first and second different timing characteristics. The chopper described in Eckstrom is provided to modulate the source radiation, but nowhere is there any mention or suggestion that this modulation be performed with different timing characteristics for the different sources, in order to differentiate between the different sources. On the contrary, the invention of Eckstrom does not even suggest the use of such sources with different timing characteristics, since in Eckstrom, in col. 7, lines 23-25, it is stated that "In operation of the apparatus, the four optical paths are exposed to radiation in a rapid repeated sequence", and in col. 10, lines 29-34, it is further stated that "Each of the four optical paths of the invention, as described above, is traversed by source radiation in repeated rapid succession, preferably by means of vacuum activated shutters, to allow repeated measuring and averaging of the respective signals, with minimal opportunity for drift between measurements." This description by Eckstrom, of **sequential** measurement of each of the four channels, makes the need for different timing characteristics of each source superfluous, since the measurements from the



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different sources are **not** made simultaneously. Different timing characteristics, which provide the currently claimed detection differentiator with signals differently labeled by means of these different timing characteristics, are only necessary in order to differentiate between sources which are measured **simultaneously**, whereas Eckstrom differentiates between sources by measuring them **sequentially**.

(c) The above arguments are also relevant in response to the Examiner's statement regarding Eckstrom that "since the detector detects all 4 wavelengths, it inherently has a differentiator to distinguish the different wavelengths". The four wavelengths are detected sequentially using the vacuum operated shutters. Therefore, although such a sequential shutter arrangement could be described as "a differentiator to distinguish the different wavelengths", it is certainly cannot be described as "a detection differentiator receiving an output from said at least two detectors and distinguishing outputs corresponding to said first and second gas discharge lamps on the basis of said first and second different timing characteristics", where the different timing characteristics arise from the operation of the discharge lamps, as specifically recited in amended claim 179.

(d) Furthermore, the applicants have been unable to locate in Eckstrom that "Eckstrom shows 4 measuring wavelengths and states that the source produces a rapid repeated sequence of **wavelengths** for the channels" (emphasis added), as asserted by the Examiner. As mentioned above, the only rapid repeated sequential action described in Eckstrom is his use of shutters to switch measurements between channels, and the applicants could not find a rapid sequence of wavelengths produced by the source described therein.

(e) Additionally, there is no indication in Eckstrom that the chopper wheel is used for modulating the sources for any reason other than to increase detection sensitivity by use of AC detection techniques. Certainly there is no mention or suggestion in Eckstrom that

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the chopper wheel is used for producing different timing characteristics for the various wavelengths, nor is there any need for such use according to the sequential measurement described in Eckstrom.

For all of the above reasons, the applicants therefore respectfully submit that nowhere in Eckstrom is there mentioned or suggested that the function of the chopper of Eckstrom can be likened to "a detection differentiator receiving an output from said at least two detectors and distinguishing outputs corresponding to said first and second gas discharge lamps on the basis of said first and second different timing characteristics" as recited in amended claim 179 of the present application. This aspect too of Eckstrom cannot therefore be used in combination with what is disclosed in Sauke et al. and in Rosenfeld, to render amended claim 179 of the present application obvious.

### Conclusion

The applicants therefore respectfully submit that, for the reasons mentioned above, claims 112-126, 128-149, 151, 158-176, 179 and 191-192 are novel, are unobvious over the prior art combination cited by the Examiner, and recite patentable material. Claims 112-126, 128-149, 151, 158-176 and 179-192 are therefore deemed to be allowable. The applicants also respectfully submit that objected-to claims 127, 150, 152-157, 177 and 178, are all ultimately dependent on deemed allowable independent claim 117, and recite additional patentable matter, and are therefore all also allowable.

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The applicants therefore earnestly request entry of this amendment, and consequent reconsideration and prompt allowance of this application.

Respectfully submitted,

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